Lectures 10
Laptops and Portable Devices

Computer Systems Administration
TE2003

Lecture overview

- At the end of lecture 10 students can identify, describe and discuss:
  - Laptops and portable devices
  - Components of a laptop
  - Laptop components vs Desktop components
  - Wireless communication for laptops and portable devices
  - Component selection
  - Preventive maintenance of laptops
  - Troubleshooting laptops

Fundamental Laptops and Portable Devices

Mike Meyers' CompTIA A+ Guide to Managing and Troubleshooting PCs

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Laptops and portable devices

- Advances in technology have resulted in laptops and portable devices that
  - Cost less
    - LCD Screen is the major contributor to cost
  - Weigh less
    - Osborne I, the 1st portable computer, weighed ~10 Kg
  - Do more
    - Games
    - Web surfing
    - e-mail
    - Instant messaging
- Notebooks, laptops, tablets, PDAs, Netbooks, Smartphones, ...

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Common uses

Laptops

- Taking notes, filling out forms
- Presenting information
- Data access and processing
- Entertainment: Games, movies, …
- Internet

PDAs

- Organize information
- Field sales

Smartphones

- PDA + mobile phone
- Media players + internet access + GPS + Wi-Fi + camera + sensors

Laptops and portable devices

Main components

- Small and portable
- Integrated LCD screen in the lid
- Integrated keyboard
- AC power source or rechargeable battery
- Hot-swappable drives and peripherals
- Some type of docking station or port replicator to connect to peripherals

Laptops (Dell Latitude E6400)

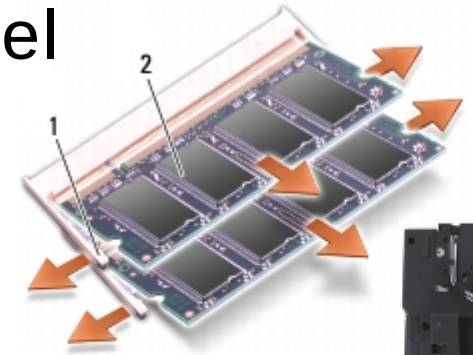
Components found on the outside (TOP)

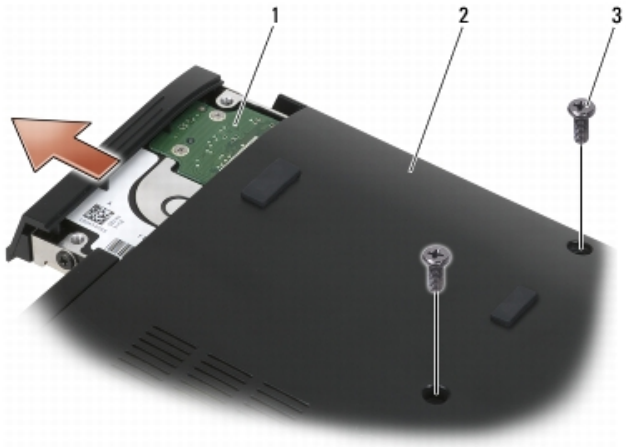
- Status leds, AC connector, Audio jacks, Ports (USB, Ethernet, VGA, ...), PC card, DVD-ROM, security keyhole, Ventilation, Speaker, etc

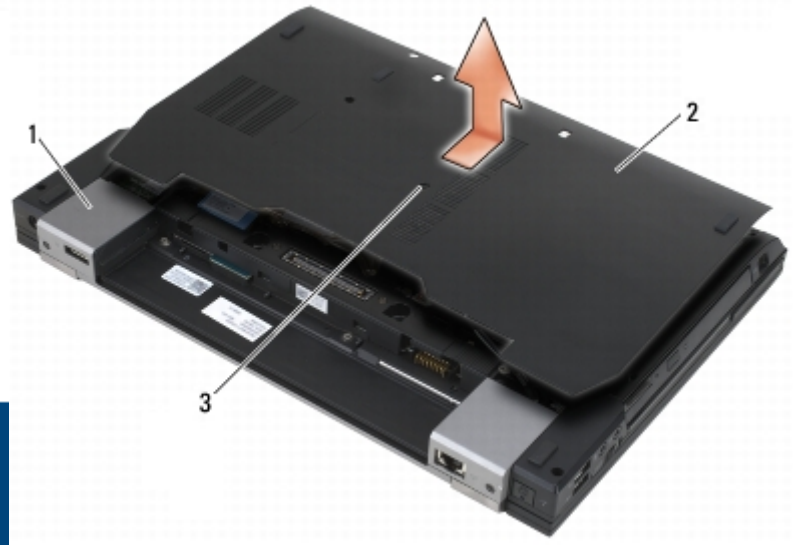
Laptops (Dell Latitude E6400)

Components found on the outside (BOTTON)

- HDD or SSD access panel
- RAM access panel
- Battery latch
- Dock Station Connector







Laptops (Dell Latitude E6400)

Input devices

- Keyboard
- Touchpad
- Point controller
- Buttons
  - Power
  - Volume
  - Side
    - Wireless
    - Bluetooth
  - Function key

Laptops (Dell Latitude E6400)

Docking station / Port Replicator

- Manufacturer- and model-specific
- Power button
- Eject button
- Laptop connector
- Several ports (USB, VGA, DVI, Serial, Ethernet, ...)
- Key lock

Laptop Components vs Desktop Components

- Desktop components tend to be standardized. They usually meet universal form factors.
- Laptop manufacturers focus on refining laptop components to make them more efficient and compact as a result, laptop components are proprietary.
- You may not be able to use components made by one laptop manufacturer to repair a laptop made by another manufacturer.

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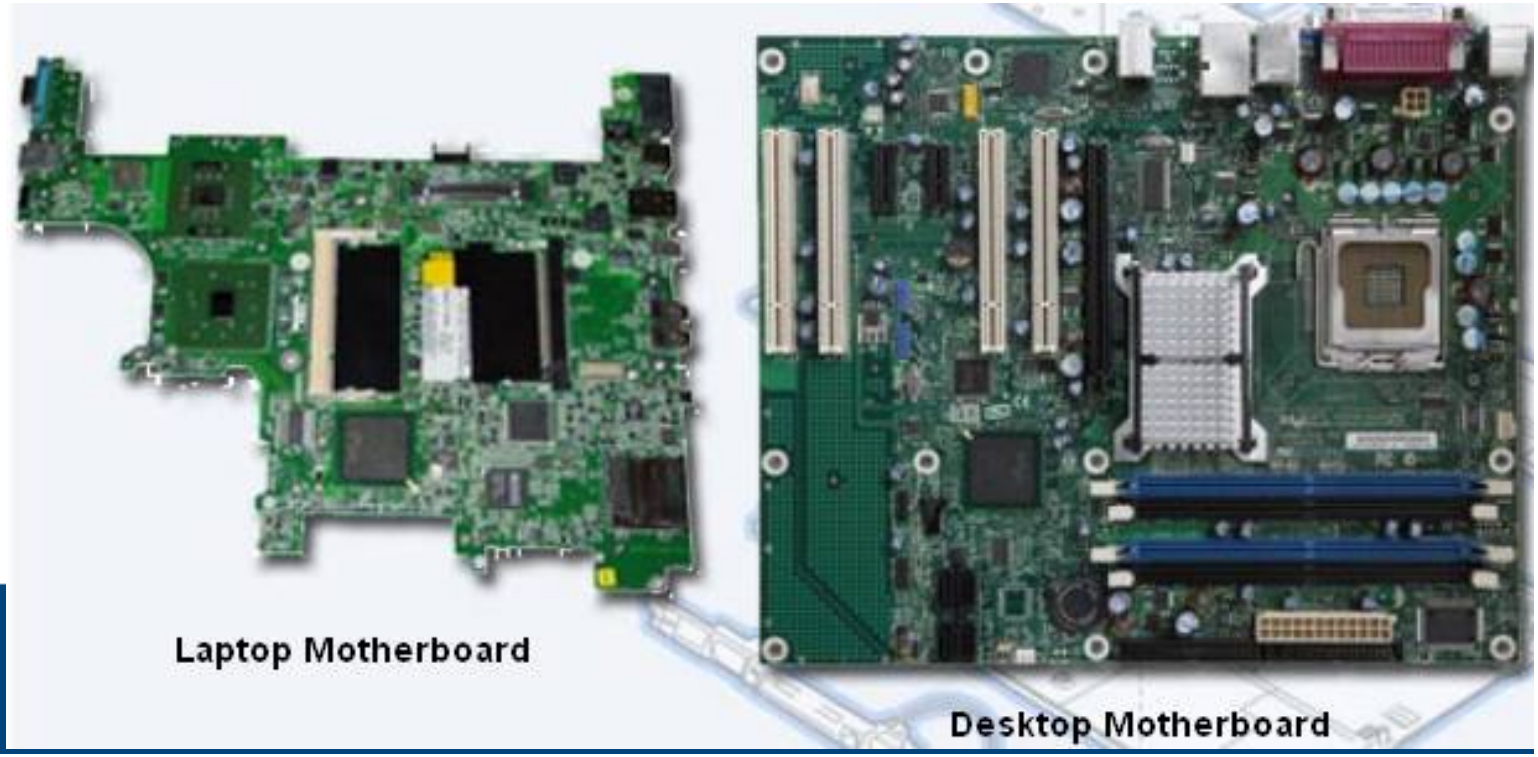
Laptop Components vs Desktop Components

Motherboard

- Desktop motherboards have standard form factors
- Laptop motherboards vary by manufacturer and are proprietary



Laptop Components vs Desktop Components

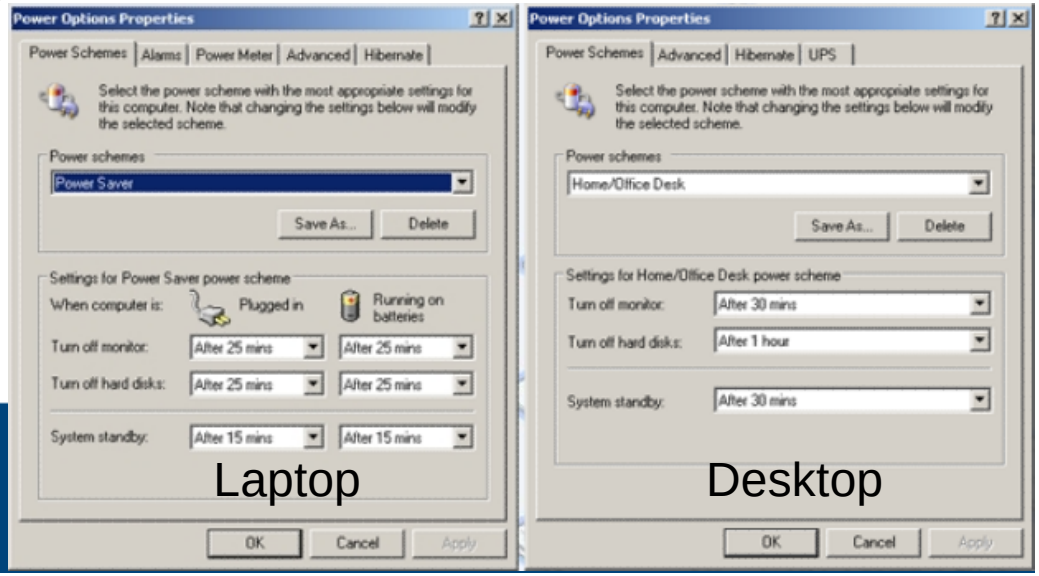
CPU

- Laptop processors are designed to use **less power** and create **less heat**
  - Do not require large cooling devices
  - Use CPU throttling
    - Modifies the clock speed as needed
    - Reduce power consumption and heat
    - Slight decrease in performance
    - Increases the lifespan of some components

Laptop Components vs Desktop Components

Power Option

- **Power management** controls the flow of electricity to the components of a computer.
  - When plugged in, the laptop power management sends electricity from the AC power source to the laptop components
  - Otherwise the laptop power management takes electricity from the battery
- Advanced Power Management (APM)
  - Earlier version of power management. With APM, the BIOS was used to control the settings for power management
- Advanced Configuration and Power Interface (ACPI)
  - Offers additional power management features
  - OS controls the power management.



Laptop Components vs Desktop Components

Expansion Capabilities

- Desktop computers provide more ports (USB, eSata, serial, ...)
- USB, sSata, FireWire standards
  - Hot swappable
- Expansion capabilities of laptops can be increased with PC Cards and USB hubs
- Laptops have limited expansion bays that are designed to allow different types of drives to fit into the same bay

Laptops and portable devices

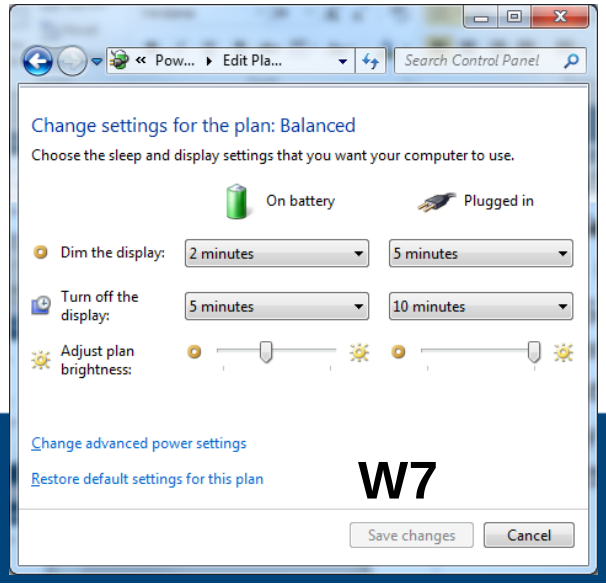
Configuration

- To allow applications and processes to run smoothly:
  - Configure and allocate system resources
  - Change environmental settings to match software requirements
- A laptop can be customized for specific purposes by adding external components
- Adding external components is usually accomplished through the use of Plug and Play, but occasionally driver installation and additional configuration may be required
- Follow safe removal procedures when disconnecting hot-swappable and non-hot-swappable devices

Laptops and portable devices

Power Settings

- Start > Control Panel > Power Options
- Power Schemes are a collection of settings that manage the power usage of the computer
- Hibernate
- Standby
- Low battery warnings



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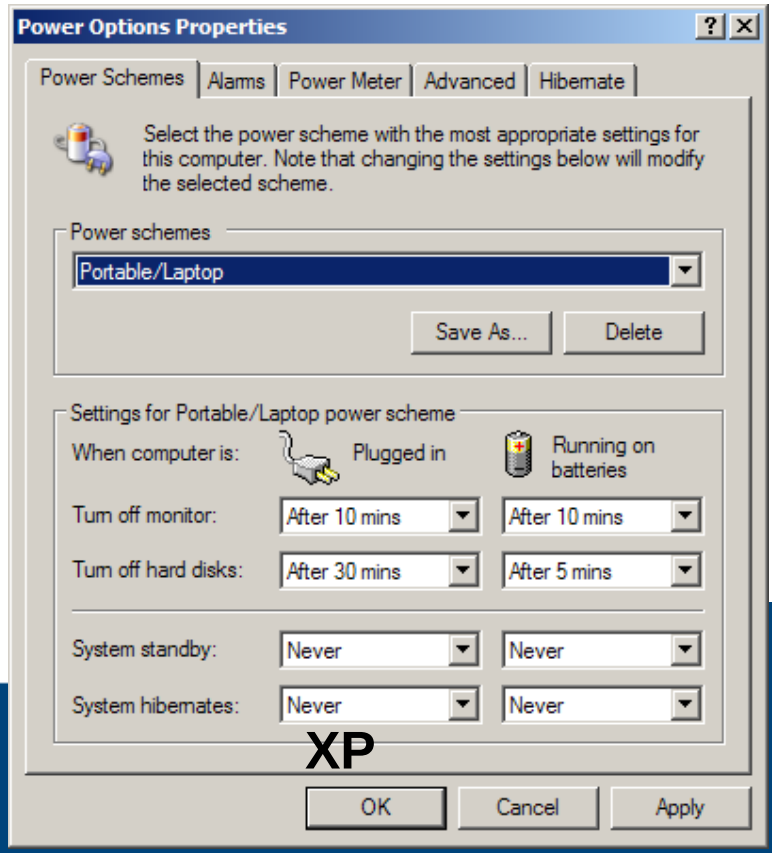

XP

Laptops and portable devices

- Mobile phone standards

Internet Standard	Purpose

Advanced Laptops and Portable Devices

Laptops and portable devices

Wireless Communication Methods

- Bluetooth
- Infrared
- Cellular
- Wi-Fi
- Satellite

Laptops and portable devices

Bluetooth

- Designed to create small wireless networks—Personal Area Networks (PANs)
  - Connecting peripherals such as keyboards, mice, headsets to the PC
- Low power, low cost, and small size
- Piconet vs. Scatternet

Class 1	100 mW	100 meters
Class 2	2.5 mW	10 meters
Class 3	1 mW	1 meter

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Laptops and portable devices

Infrared (IR)

- Infrared devices connect using light waves
- Simple way to share data without adding any additional hardware or software
- Short-range (1m), low-throughput (4Mbps) wireless technology
- Line-of-sight required
- No authentication or encryption

Infrared Specs	
Standard	Infrared (IrDA)
Max. throughput	Up to 4 Mbps
Max. range	1 meter (39 inches)
Security	None
Compatibility	IrDA
Communication mode	Point-to-point ad hoc

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Laptops and portable devices

Cellular

- PDAs and smartphones today allow connection to the Internet
- Can add this to laptop with PC Card or USB
- Downloads as quick as 400 to 700 Kbps (GPRS: 56-114 Kbps)
- Cellular networks have their own protocols, such as **General Packet Radio Service (GPRS)** and **Global System for Mobile Communications** (GPM)
- Downside is the price

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Laptops and portable devices

Comparing wireless technologies

	Purpose	Devices	Range	Frequency	Limitation
Bluetooth 1-3 Mbps	Radio-frequency creating a WPAN connecting portable devices	Laptop, printer, camera, PDA, cell phone, smartphone, hands-free headset	Low-power, short range; 1 to 100 meters (3 to 330 feet)	2.4 to 2.485 GHz	Device must be Bluetooth compatible.
Infrared (IR) ~56 Kbps	Light waves used as a data transmission medium	projector, PDA, printer, remote control, wireless mouse, wireless keyboard	low-power, short range (1 meter); low through-put	100 GHz to 1000 THz	Susceptible to interference and dilution
Cellular 56-114 Kbps	Cellular signal creating a WWAN	Laptop, cell phone, PDA, smartphone	Within several miles of cellular tower	850 to 1900 MHz	Only where cell signal reaches
Wi-Fi 11, 100+ Mbps	Radio-frequency creating high-speed WLAN	Laptop, printer, and other network devices	33 to 100 meters (100 to 300 feet)	2.4 GHz or 5.0 GHz	The 2.4 GHz range is unregulated and heavily used.
Satellite ~500 Kbps	High-speed Internet access; ideal when no other broadband access available	Laptop, GPS devices, smartphone	To the satellite	Up to 5,000 channels per satellite	Slower than DSL/Cable; higher setup costs

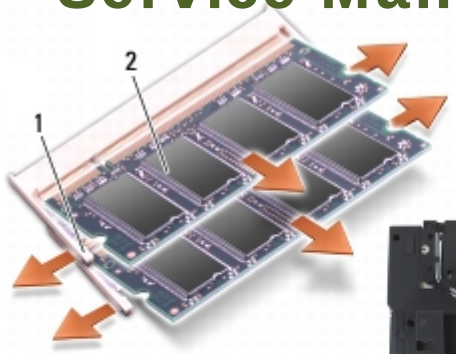
Selecting Components

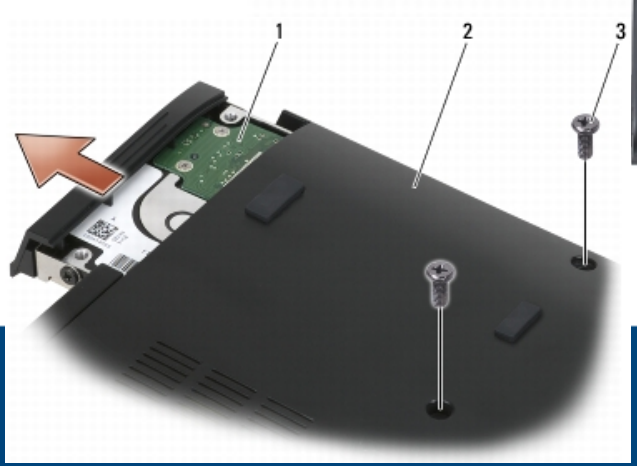
Installation and removal of components

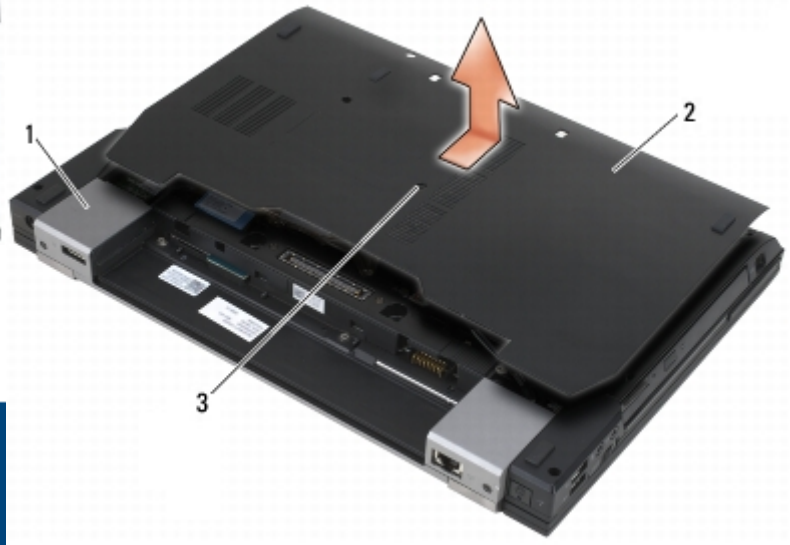
- **No standard method**
- Best friend
  - **Service Manual**

BEFORE YOU START

- **Disconnect power**
- **Remove the battery**







Selecting Components

Batteries

- When you need a new laptop battery?
  - Laptop shuts off when AC power is removed
  - Battery is leaking
  - Battery overheats or does not hold a charge
- Three common types
  - Nickel-Cadmium (Ni-Cd)
  - Nickel-Metal Hydride (Ni-MH)
  - **Lithium-Ion (Li-Ion)**
    - Most common type used today
    - Powerful
    - Immune to memory problems
    - Built-in circuitry to prevent accidental overcharging

Laptops and portable devices

Preventive maintenance

- Everything you normally do to maintain a PC applies to portable PCs
  - Windows patches and Service Packs
  - Upgrading drivers
  - Error-checking
  - Defragmenting and Disk Cleanup
- Plus there are other issues
  - Batteries
  - Power Management
  - Cleaning and heat
  - Protecting the portable from harm
    - Transport, operating environment

Laptops and portable devices

Preventive Battery maintenance

- Batteries should be stored in a cool place
- Ni-Cd and Ni-MH batteries should be conditioned by using a special charger
- Battery contacts should be kept clean using a little alcohol or dry cloth
- Never handle a ruptured battery
- Used or old batteries should be recycled

Laptops and portable devices

Troubleshooting

- Laptop won’t power on
  - Verify the outlet is good
  - Verify the AC adapter is good
  - Remove all peripherals
- Screen doesn’t come on properly
  - Make sure the display is on
  - Press FN key combination to activate the screen
  - Bad inverter or CCFL = dim screen
- Wireless networking doesn’t work
  - Check for physical switch to turn it on
  - Ensure you’re in range

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Laptops and portable devices

Troubleshooting

- Handwriting is not recognized
  - May need to retrain the digitizer
- Keypad doesn’t work
  - Probably unseated keypad connector
  - Check manufacturer’s disassembly procedures
- Touchpad doesn’t work
  - Clean with compressed air
  - May need to reconfigure touchpad driver

Laptops and portable devices

Troubleshooting

- Numbers appear during normal QWERTY typing
  - Check the NUMLOCKS key
- Laptop screen turns on and off while typing
  - User might be pressing the CRT/LCD keyboard button by mistake
- Touchpad overly sensitive or not sensitive enough
  - Adjust in the Control Panel applet